

USING MULTIPLE TRANSFORMATIONS to GRAPH QUADRATIC FUNCTIONS

Applying Transformations in Order:

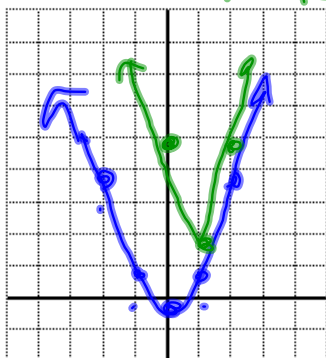
Example 1: Graph the following quadratic functions, using key points, by applying the transformations in the order listed. *Explain the results.*

→ $g(x) = 3(x - 1)^2 + 2$

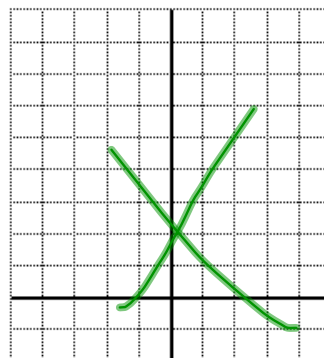
- ✓ → vertical stretch by a factor of 3
 ✓ → horizontal shift right 1 unit
 ✓ → vertical shift up 2 units

- b) → horizontal shift right 1 unit
 → vertical shift up 2 units
 → vertical stretch by a factor of 3

$a = 3$ $h = 1$ $k = 2$



CORRECT / INCORRECT



CORRECT / INCORRECT

$(x+h, ay+k)$

$(x+1, 3y+2)$

$y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4



$y = 3(x-1)^2 + 2$

x	y
-1	14
0	5
1	2
2	5
3	14

6. $y = x^2$ vertex $(2, -4)$

$\Rightarrow y = (x-2)^2 - 4$

a) 2 down

$y = (x-2)^2 - 4 - 2$

$y = (x-2)^2 - 6$

b) 4 to the left

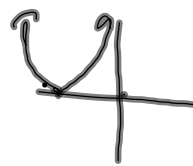
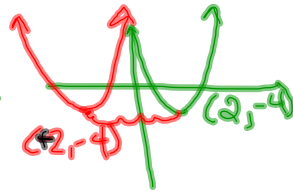
$y = (x-2+4)^2 - 4$

$y = (x+2)^2 - 4$

c) 2 to the \odot and 3 up

$y = (x-2+2)^2 - 4 + 3$

$y = x^2 - 1$



4 d) $y = -\frac{1}{3}(x+4)^2$

$a = -\frac{1}{3}$

$h = -4$

$k = 0$

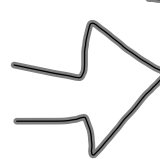
-reflected in
x-axis

-vertical
compression

-left 4

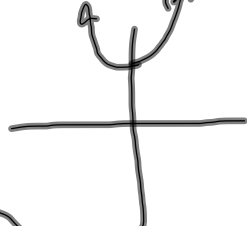
$(x+h, ay+k)$

$(x-4, -\frac{1}{3}y)$



x	y
-6	-4/3
-5	-1/3
-4	0
-3	1/3
-2	4/3

7a)



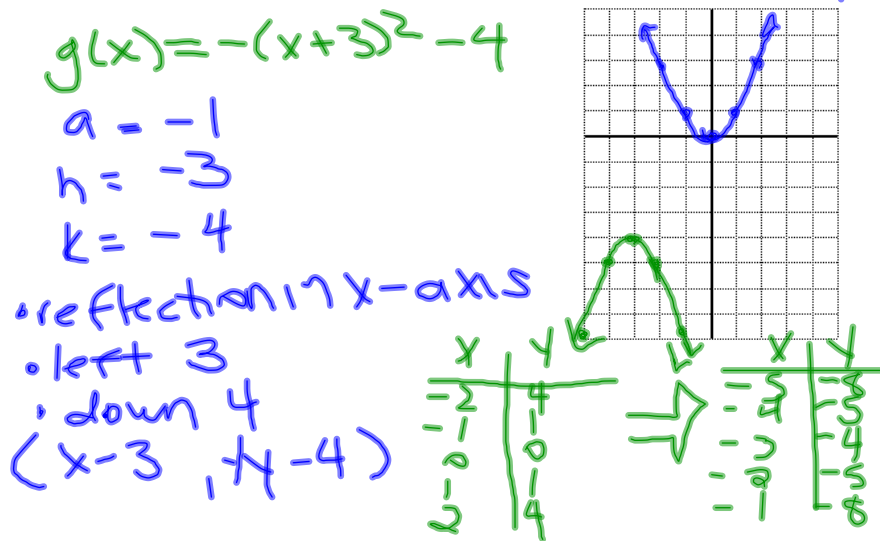
$y = x^2 + 4$

7a)

$y = 4(v-2)^2$

e) $v = 0.5(x+2)^2$

Example 2: Graph $g(x) = -1(x+3)^2$ using transformations.



Example 3: Consider parabola P that is congruent to $y = x^2$ and has vertex $(2, -4)$. Find the equation of a new parabola that results if P is translated 2 units left and 3 units up.

$y = a(x-h)^2 + k$
 $y = (x-2)^2 - 4$
 $y = (x-2+2)^2 - 4 + 3$
 $y = x^2 - 1$

Example 4: Write an equation of the parabola that has a vertex at $(4, 1)$ and passes through the point $(2, 9)$.

$y = a(x-h)^2 + k$
 $9 = a(2-4)^2 + 1$
 $9 = a(-2)^2 + 1$
 $9 = a(4) + 1$
 $8 = 4a$
 $\frac{8}{4} = \frac{4a}{4}$
 $2 = a$
 $y = 2(x-4)^2 + 1$